

U.S. Patent Application Serial No. **10/527,699**
Amendment filed January 2, 2008
Reply to OA dated August 2, 2007

REMARKS

Claims 1-20 are pending in this application. In the present amendment, claim 8 has been canceled without prejudice or disclaimer, and claims 1, 4, 6, 9-15, 17, 19 and 20 have been amended. Upon entry of this amendment, claims 1-7 and 9-20 will be pending.

The applicant respectfully submits that no new matter has been added. Support for the amendments to the claims is detailed below. It is believed that this Amendment is fully responsive to the Office Action dated **August 2, 2007**.

Claims 8, 10, 11, 17, 19 and 20 are objected to for informalities. (Office action paragraphs no. 1-6)

The objections are overcome by the amendments to the claims, as follows.

In paragraph no. 1, the Examiner objects to claim 8 over the use of parenthetical expressions in the claims. Claim 8 has been canceled without prejudice or disclaimer. Where the text of claim 8 is incorporated into claim 1 in the present amendment, the claim has been rewritten to eliminate the parentheses.

In paragraph no. 2, the Examiner objects to the word “and” in claim 10, stating that this is an alternative and should use the word “or.” The Examiner is correct that formulas [1], [2], [3], [4] and [5] represent alternatives, and the wording of the claim has been clarified by reciting: “at least one of the monomers ~~monomer~~ having”

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In paragraphs no. 3 and 4, the Examiner suggests grammatical improvements to claims 10 and 11. The claims have been amended as suggested.

In paragraph no. 5, the Examiner requests that claims 17, 19 and 20 be rewritten to clearly recite the steps of the method. The claims have been amended as suggested.

In paragraph no. 6, the Examiner objects to the wording of the last phrase of claim 19, stating that “substitutes” is the wrong tense of the verb. Claim 19 has been amended as suggested.

Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. (Office action paragraph no. 8)

The Examiner states that the chemical fragment described in the claim is of unclear scope.

The rejection is overcome by the amendment to claim 13, clarifying this recitation. The amendment clarifies that both the “alkylene chain” and “another alkylene chain” in the crosslinked organic polymer compound are present in the crosslinked organic polymer. Applicant also notes that “exiting” in the original claim was a typographical error and should have been “existing”(see page 31, line 6, of the specification). Support for the clarifying amendment to claim 13 may also be found at page 31, lines 12-17.

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Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. (Office action paragraph no. 9)

The Examiner states that he does not understand how monomer (3) is a copolymer.

Reconsideration the rejection is respectfully requested in view of the amendment to claim 15. Applicant notes that, in the amendment to claims 14 and 15, the arabic numerals have been replaced with Roman numerals, e.g., “(1)” is replaced by -- (I) --.

Claim 15 depends from claim 14, and the term “monomer of (3)” had referred to the recitation of labeled clause (3) of claim 14, of “an acrylic acid type monomer or a monomer containing a hydroxyalkyl group having at least one oxygen atom and a polymerizable double bond.” Claim 14 recited that “the crosslinked organic polymer compound is that obtained by crosslinking a copolymer of: compounds” (1), (2) and (3), of which (3) was a “monomer.”

The recitation of claim 15 has been amended to delete the recitation “is a copolymer of a monomer having.”

Claims 1-20 are rejected under 35 U.S.C. §102(b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Králik et al. (*J. Mol. Catal. A*, 1995) and Corain et al. (*J. Mol. Catal. A*, 2001). (Office action paragraph no. 13)

The Examiner discusses the preparatory method in the references, and refers to Figure 8 of Králik and Figs. 2 and 3 of Corain as revealing “the presence of platinum nanoclusters distributed

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within the crosslinked polymer.” The Examiner states that in these cases, palladium particles are physically carried on the crosslinked polymer, and that “the final product is essentially the same as that described in the claims, namely, a palladium catalyst physically carried on a crosslinked organic polymer compound.” The Examiner refers to the product-by-process nature of the present claims, stating that the burden is on the Applicant to show a difference from the prior art.

Reconsideration of the rejection is respectfully requested in view of the amendments to the claims and the data in the attached Declaration under 37 CFR 1.132.

Claim 1 has been amended to incorporate the limitations of claim 8. In addition, “(3) a monomer having a hydroxyl group, an acyloxy group, an isocyanate group or an amino group” recited in previous claim 8 has been amended to: “(3) a monomer having a hydroxyl group” in amended Claim 1, that is, “an acyloxy group, an isocyanate group and an amino group” have been deleted, as supported on page 22 lines 11-13.

However, the polymer in the amended claim 1 (hereinafter occasionally abbreviated as “the polymer of the present invention”) is different from the polymers in Králik et al. and Corain et al. That is, although the polymer in Králik et al. is poly-N,N-dimethylacrylamide-p-styrylsulfonate with methylene bis (acrylamide) as disclosed in the abstract, the polymer of the present invention does not include the polymer having sulfonate group. Therefore, the structure of the polymer in Králik et al. is different from that of the polymer of the present invention.

Corain et al. discloses the anionic gel-type resins and cationic resins etc. having the functional group as the crosslinked polymer, but does not disclose the specific structure of the polymer. That is, Corain et al. does not disclose the polymer of the present invention.

Therefore, the composition of the present invention is different from the compositions disclosed in the references, and the claims are not anticipated by either reference.

Further, as the Examiner has acknowledged, the preparation method is different between the composition of the present invention and the compositions of the references. The composition of the present invention is obtained by carrying a palladium catalyst on a straight chain organic polymer compound once, and then subjecting it to a crosslinking reaction. On the other hand, the compositions in Králik et al. and Corain et al. are obtained by carrying the palladium directly on the crosslinked polymer. Moreover, their properties are also different. In particular, the palladium in the compositions in Králik et al. and Corain et al. exists under strong influence of the chemical interaction from the functional group in the crosslinked polymer, as disclosed in the following Fig. 8 in Corain et al.

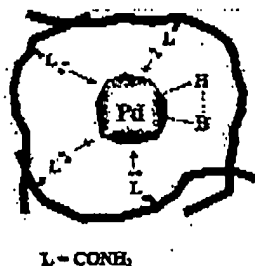


FIG. 8. Schematic picture of the observed interaction of the amide groups present in the functional organic support with a Pd nanocatalyst.

Though this palladium composition can be effectively used as the catalyst in the hydrogenation reaction because the zero-valent palladium gives the effect in the reaction, it is necessary for the catalyst effect in the substitution reaction at the allyl position that the palladium changes from zero-valent to divalent and from divalent to zero-valent. Thus, the composition in Králik et al. and Corain et al. can not give the catalyst effect in the reaction because the valence of the palladium cannot change freely in the above strong interaction.

On the other hand, in the composition of the present invention, since the composition of the present invention obtained by the carrying a palladium catalyst on a straight chain organic polymer compound once, and then subjecting it to a crosslinking reaction, the palladium is physically carried on the network part in the network structure of the crosslinked organic polymer. Then, the palladium is not strongly influenced by the chemical interaction. The composition of the present invention does not have the function group causing strong chemical interaction. Thus, the value of the palladium in the composition of the present invention can change and the composition gives the catalyst effect in the substitution reaction at the allyl position as shown in Examples 7 to 12 in the present specification. Therefore, since the composition in the references cannot give the catalyst effect in the substitution reaction at the allyl position that is the effect of the present invention, it is natural that the effect of the present invention can not be expected over these references.

The Applicant here presents experimental data in the attached Declaration under 37 CFR 1.132, of the substitution reaction at the allyl position using the palladium composition in which the palladium is carried directly on the crosslinked polymer having the functional group, as disclosed

in Králik et al. and Corain et al. Specifically, as in the cited references, palladium is fixed on a crosslinked polymer. The product is used as a catalyst in a substitution reaction at an allyl position, but the result is that the substitution reaction did not proceed.

These data show that the palladium composition in which the palladium is carried directly on the crosslinked polymer having the functional group, namely, the composition in which the palladium is carried by the strong interaction from the functional group does not have the catalyst effect in the substitution reaction at the allyl position. Therefore, the compositions in Králik et al. and Corain et al. are clearly different in this point, and the present invention is not anticipated by these references.

Moreover, Králik et al. and Corain et al. neither teach nor suggest the catalyst effect in the substitution reaction at the allyl position. The pending claims are therefore not anticipated by, nor obvious over, Králik et al. and Corain et al.

Claims 1-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Funaki et al. (U.S. 6,054,507). (Office action paragraph no. 14)

Funaki discloses a metal-organic polymer composite. The Examiner refers to the preparation method in column 8, line 64 and ff., in which a non-water-soluble organic polymer, a solvent-soluble metal compound and a reducing agent are dissolved in an organic solvent and heated, apparently depositing a solid. Although Funaki does not appear to disclose a crosslinking step after the

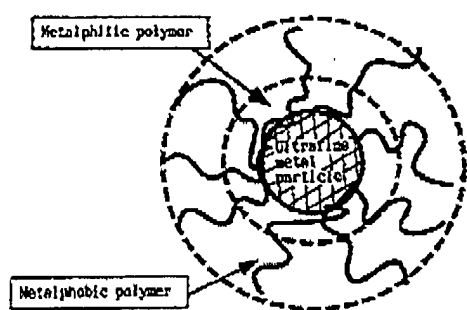
depositing step, as in claim 1, the Examiner states that the palladium is carried on the crosslinked polymer, and would be structurally the same as that of the present claims.

Reconsideration of the rejection is respectfully requested in view of the amendments to the claims and the data in the attached Declaration under 37 CFR 1.132.

Funaki et al. discloses a block copolymer in which a metalphilic polymer chain and a metalphobic polymer chain are bonded together at each end, and ultrafine metal particles are contained in the metalphilic polymer phase of the microphase-separated structure. The metalphilic polymer is exemplified by a polymer composed of a monomer unit having a nitrogen atom such as poly(2-vinylpyridine), polyaminostryrene, and the like; a polymer composed of a monomer unit having an oxygen atom such as poly(methylmethacrylate) and the like; a polymer composed of a monomer unit containing sulfur such as poly(propylene sulfide), as disclosed in col. 9, lines 33-40, in the specification of Funaki et al. No concrete example of metalphobic polymer is disclosed in Funaki et al. In the Examples, a block copolymer composed of poly(2-vinylpyridine) and polyisoprene is the only disclosed polymer (Examples 1-4). However, the polymer of the present invention does not include a polymer containing a monomer having pyridine. Therefore, the composition in Funaki et al. is different from the composition of the present invention. The present claims are therefore not anticipated by Funaki et al.

The polymer in Funaki et al. carries the ultrafine metal particle by the interaction of metalphilic polymer, concretely, by the interaction of nitrogen atom, oxygen atom or sulfur atom as disclosed in the following Fig. 1. That is, the palladium composition in which the palladium is

carried in such a structure can not make the valent of the palladium change, as same as Králik et al. and Corain et al. Then, unlike the composition of the present invention, the composition in Funaki et al. can not be used as the catalyst in the substitution reaction at the allyl position. Therefore, the effect of the present invention cannot be expected over Funaki et al.



Further, although Funaki et al. discloses that the composition can be utilized as functional materials such as catalysts (col. 1, lines 8-9), there is no example using the composition as the catalyst. The Funaki et al. reference neither teaches nor suggests a catalyst effect in the substitution reaction at the allyl position. Therefore, the effect of the present invention, which is useful for the substitution reaction at the allyl position, cannot be expected over Funaki et al.

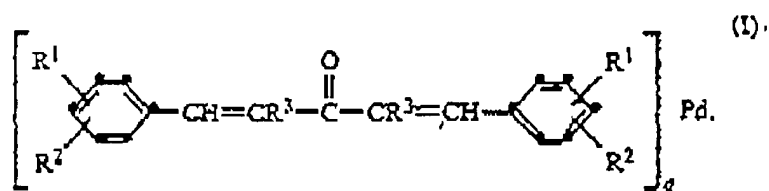
The present claims are therefore not anticipated by, and are not obvious over, Funaki et al.

Claims 1-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Tieke et al. (U.S. 5,045,436). (Office action paragraph no. 14)

Tieke discloses polymer compositions containing a dissolved dibenzalacetone palladium complex. The Examiner cites claim 1 of the reference as disclosing a process including dissolving a palladium complex in a polymer followed by casting on a substrate. The Examiner cites column 3, lines 31-36, as disclosing that crosslinking is carried out after preparation of the complex-prepolymer mixture.

Reconsideration of the rejection is respectfully requested in view of the amendments to the claims.

Tieke et al. discloses the composition containing organic polymer and a dibenzalacetone palladium complex of the following formula I:



However, the polymer of the present invention does not include a polymer containing the above dibenzalacetone complex. Thus, the polymer of the present invention and the polymer in Tieke are clearly different. Further, the dibenzalacetone palladium complex is homogeneously dissolved in the polymer but is not copolymerizable therewith (col. 1, lines 41-51). That is, in the composition in

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Tieke et al., the palladium exists in the complex and is not carried on the crosslinked polymer. Thus, the composition in Tieke et al. is clearly different from the polymer of the present invention in which the palladium is carried on the crosslinked polymer. Therefore, the present invention is not anticipated by Tieke et al.

The composition in Tieke et al. is used for metal deposition or for producing conductive patterns, as disclosed in Abstract. Tieke et al. does not disclose use of the composition for the catalyst. Therefore, as disclosed above, since the composition in Tieke et al. is different from the composition of the present invention and Tieke et al does not disclose use of the composition for the catalyst, it can not be expected over Tieke et al. that the composition of the present invention is applied to the catalyst and that the composition has useful catalyst effect in the substitution reaction at the allyl position. The present invention is therefore not obvious over Tieke et al.

Claims 1-20 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kirk et al. (U.S. 6,743,873). (Office action paragraph no. 14)

Reconsideration of the rejection is respectfully requested.

Kirk et al. discloses a catalyst composition comprising (a) at least one catalytic component, (b) at least one activator component and (c) at least one epoxy functional porous organic polymer. The polymer of the present invention includes the polymer containing the glycidyl compound having an epoxy group. However, Kirk et al. does not disclose a specific composition that combines the

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polymer and palladium, and does not also disclose a composition that combines palladium and the above polymer containing the glycidyl compound having an epoxy group. Therefore, the composition of the present invention is not disclosed in Kirk et al., and is not anticipated by this reference.

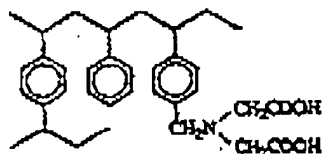
Kirk et al. discloses the preparation of DVB-crosslinked epoxy functional porous organic polymer containing units derived from glycidyl methacrylate in Example B. However, Kirk et al. does not disclose a catalyst composition using the above DVB-crosslinked epoxy functional porous organic polymer, and, correspondingly, does not also disclose the palladium composition comprising the DVB-crosslinked epoxy functional porous organic polymer and the palladium. Therefore, the effect of the present invention resulting from using the composition comprising specific polymer and palladium cannot be expected from the reference.

Further, Kirk et al. discloses the composition of the reference is useful for catalyzing the polymerization of olefinic monomers (abstract), but neither teaches nor suggests a catalyst effect in the substitution reaction at the allyl position. Thus, the catalyst effect in the substitution reaction at the allyl position by the composition of the present invention cannot be expected over the reference.

The present invention is therefore not obvious over Kirk et al.

Claims 1-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Toshima et al. (*Reactive Polymers*, 1991). (Office action paragraph no. 17)

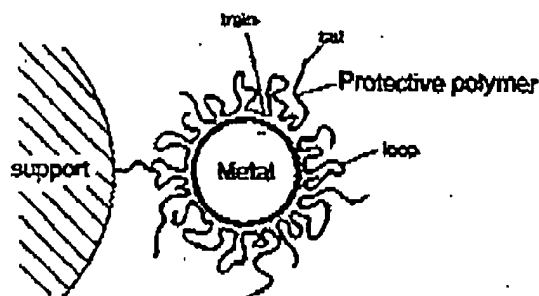
Toshima et al. discloses composition in which the palladium is carried on the polymer obtained by incorporating Na or Mg ion to the following resin (CR-10):



(b) CR-10

However, the polymer of the present invention does not include a polymer having such a structure as CR-10, and in particular, does not include a polymer having a $^{-}\text{CH}_2\text{N}(\text{CH}_2\text{COOH})_2$ group. The structure of the composition in Toshima et al. is clearly different from that of the composition of the present invention, and the present claims are not anticipated by this reference.

In the composition in Toshima et al., the metal is strongly carried by protective polymer, as disclosed in Fig. 2 on page 139. In this case, the palladium cannot freely change valence, similarly to the compositions in Králik et al. and Corain et al. Thus, the composition in Toshima et al. cannot be used as a catalyst for a the substitution reaction at the allyl position, and cannot give the effect of the present invention.



Further, Toshima et al. discloses an effect as a hydrogenation catalyst, but neither teaches nor suggests a catalytic effect in the substitution reaction at the allyl position. Thus, the catalyst effect in the substitution reaction at the allyl position by the composition of the present invention cannot be expected over Toshima et al, and the present claims are not obvious over Toshima et al.

Claims 1-20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Charmot et al. (U.S. 4,943,482). (Office action paragraph no. 18)

Charmot et al. discloses metallized polymer particles. The metals include palladium, and the polymer is exemplified by the crosslinked polymer derived from noncomplex nonionic monoethylenic monomer, ethylenically unsaturated carboxylic acid, monoethylenic monomer and nonionic crosslinkable polyethylenic monomer. However, a specific combination of palladium and the polymer is only disclosed in Example 2, which is combination of palladium and the polymer obtained by polymerizing styrene, divinylbenzene and 4-vinylpyridine. That is, the palladium composition in Charmot et al. comprises the palladium and the polymer containing styrene,

divenylbenzene and vinylpyridine. However, the polymer of the present invention does not include the polymer having pyridine. Therefore, the polymer in Charmot et al. is clearly different from the polymer of the present invention, and the present claims are not anticipated.

The composition in Charmot et al. is obtained by contacting palladium chloride with the crosslinked polymer having pyridyl group in methanol. That is, the composition obtained by such a method is different from the composition of the present invention, which is obtained by carrying a palladium catalyst on a straight chain organic polymer compound once, and then subjecting it to a crosslinking reaction. In the composition in Charmot et al., the palladium is carried by the interaction with pyridyl group, similarly to the compositions in Králik et al. and Corain et al. Thus, in the composition in Charmot et al., the valence of the palladium cannot change freely, similarly to the situation in Králik et al. and Corain et al. The composition in Charmot et al. cannot be used as the catalyst in a substitution reaction at the allyl position, that is, cannot give the effect of the present invention.

Further, the composition in Charmot is used for the preparation of electrically conductive adhesive and paints in microconnections and as a waveguide (col, 4 lines 25-28). The Charmot et al. reference neither teaches nor suggests use of the composition as a catalyst. Therefore, it cannot be expected over Charmot et al. that the composition of the present invention can be used as a catalyst and that the composition has a useful catalytic effect in a substitution reaction at the allyl position. The present claims are therefore not obvious over Charmot et al.

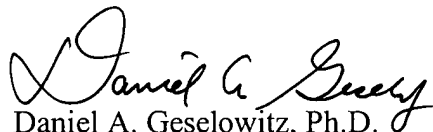
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If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, the applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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PATENT & TRADEMARK OFFICE

Enclosures: Declaration under 37 CFR 1.132
Petition for Extension of Time (two-months).

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